

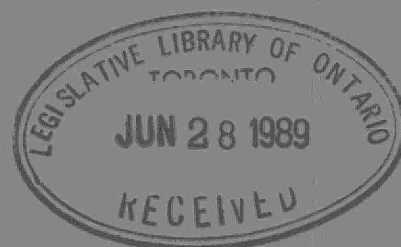
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ISBN 0-7729-3739 7

PHYTOTOXICOLOGY MOSS BAG
ASSESSMENT SURVEY
IN THE VICINITY OF
UNIVERSAL TERMINAL LTD.,
IROQUOIS

September, 1986 through April, 1987

AUGUST 1988



Environment
Ontario

Jim Bradley
Minister

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ISBN 0-7729-3739-7

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Phytotoxicology Moss Bag Assessment Survey
in the Vicinity of Universal Terminal Ltd.,
Iroquois - September, 1986 through April, 1987.

Phytotoxicology Section
Air Resources Branch

ARB No. ARB-158-87-Phyto
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C QUEEN'S PRINTER FOR ONTARIO, 1988

SOMMAIRE

En 1986-1987, le ministère de l'Environnement a effectué à Iroquois, près de la société Universal Terminal Ltd. (UTL), une analyse à l'aide de filtres garnis de mousse, semblable à celle de 1985. Il s'agissait, dans les deux cas, de déterminer si le déchargement annuel de sel, effectué à la fin de l'automne, causait des rejets de sel dans la région. Le Ministère a entrepris cette analyse à la demande de R. Delaquis, de son bureau à Cornwall. D'après les résultats de l'analyse de 1985, il y aurait eu des rejets importants de sel au nord-est du site de déchargement.

Tout comme en 1985, les résultats de l'analyse faite en 1986-1987 révèlent que le déchargement annuel de sel effectué par UTL à la fin de l'automne peut être la cause de rejets importants de sel. Selon des données recueillies récemment, le sel employé en hiver pour déglacer le chemin Lakeshore serait aussi une source importante de pollution.

Phytotoxicology Moss Bag Assessment Survey in the Vicinity of
Universal Terminal Ltd., Iroquois -
September, 1986 through April, 1987.

A moss bag survey during 1986-87, as in 1985, was conducted in the vicinity of Universal Terminal Ltd. (UTL), Iroquois, to determine the status of salt emissions associated with the once-yearly boat-salt unloading operations at UTL during the late fall. The survey was requested by R. Delaquis, MOE, Cornwall. The 1985 moss bag survey results revealed significant off-site salt migration to the neighbouring northeast during the boat-salt unloading operations in 1985.

1986-87 Moss Bag Program

On September 16, 1986, a single moss bag was placed at a height of about 3 m (10') at 9 regular stations (Sites 2,3,4,5,7,8,9,10,11) established in 1985 and at two new sites (Sites 13&14). Last year's Site 12 was re-established on Oct. 1, 1987. The sites were situated along Lakeshore Drive at increasing distance to the west and east of UTL's salt storage pad (see attached figure....). During mid-September through December 17, 1986, there were 9 weekly and 2 biweekly exposures, and from mid-December to April 21, 1987 the moss bags were exchanged about every 30 days (monthly). The exchanges were conducted by Mr. Delaquis, MOE, Cornwall.

All moss bags taken down at the end of each exposure period were submitted on a dry weight basis to the Inorganic Trace Contaminants Section, MOE, to be analyzed for sodium and chloride.

Other Relative Information

The yearly salt shipment by boat arrived and was unloaded at UTL's salt storage pad on or about November 7, 1986.

During the same week, on November 6, 1986, the County Road Department commenced applications of deicing salt to Lakeshore Drive.

Mr. Delaquis, MOE, Cornwall additionally reported that after the week of December 28, 1986, no salt was stored on the UTL salt storage pad.

Analytical Results

During exposure periods (September through Nov. 5, 1986) preceding the boat-salt unloading at UTL, salt levels detected at all moss sites generally were low, with both sodium and chloride levels not exceeding 400 ppm (see Table I).

During the exposure period (Nov. 5-18, 1986) covering the salt unloading period, moss levels of salt increased at most sites including remote sites (see Table 2). However, the fact that the largest increases occurred at Sites 5,9 and 10 in the immediate area of UTL and that the levels of sodium (850-1,400 ppm) and chloride (1,300-1,500 ppm) at these sites were significantly higher than the highest control levels (460 ppm Na; 800 ppm Cl) detected at remote sites, indicates the boat-salt unloading operations had contributed to the above normal moss salt levels found in the vicinity of the UTL salt storage pad. In relation to the excessive sodium (2,600 ppm) and chloride (4,400 ppm) moss levels that resulted from UTL's salt unloading operations in 1985, the elevated salt levels detected at Sites 5,9 and 10 in 1986 generally were lower.

During subsequent exposure periods through to mid-December, 1986, the sodium and chloride levels detected at moss sites (5,9,10) in the immediate area of UTL were significantly reduced, further indicating that UTL's salt unloading operations were a significant contributor to the increase in salt levels detected at sites neighbouring UTL during the boat-salt unloading period.

During winter monthly exposure periods between Dec. 17, 1986 and April 21, 1987, salt levels in moss throughout the survey area generally were elevated, but the data did not display any pattern in relation to UTL. The fact that no salt was stored at UTL after the week of December 28, implicates applications of deicing salt to Lakeshore Drive as being primarily responsible for the elevated moss salt levels found during the winter exposures. The highest winter moss levels of sodium (1,700 ppm) and chloride (2,200 ppm) were detected during the mid-January to mid-February (1987) exposure. The moss data further indicated that the winter deicing salt applications to Lakeshore Drive generally had resulted in more extensive salt contamination in the area than UTL's salt unloading operations in 1986.

Summary

In summary, the moss bag survey results for 1986-87, as in 1985, indicate that the once-yearly boat-salt unloading operations at UTL during the late fall can result in significant salt migration off the UTL property. The more recent moss bag data further indicated that deicing salt applications to Lakeshore Drive by the County during the winter months also can be a significant salt source.

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Approximate Moss Bag Locations In Relation To The UTL Salt Storage Pad - 1986-1987.

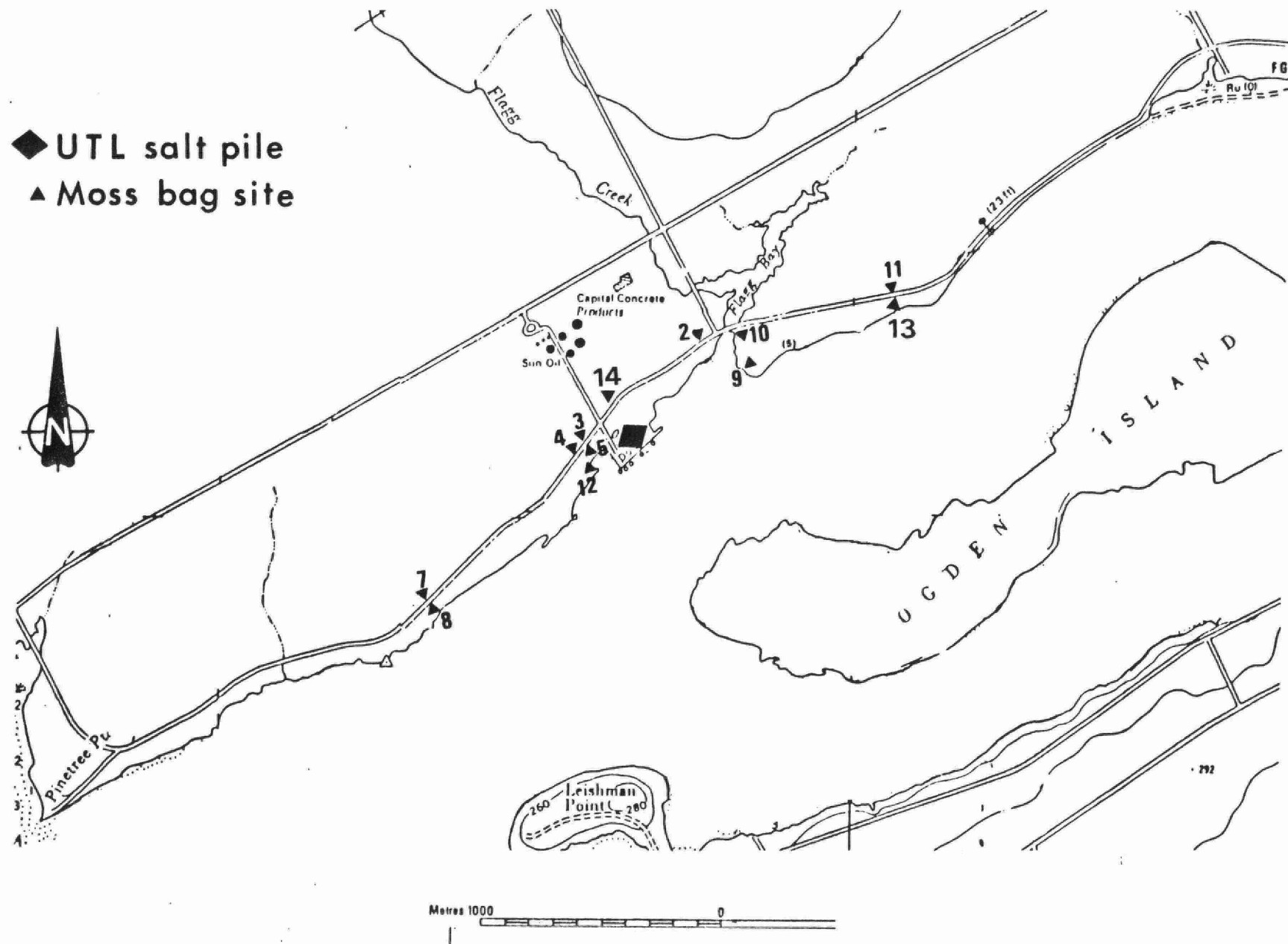


Table 1
Moss Bag Concentrations (ppm, dry wt.) of Chloride and Sodium Detected in the UTL
Survey Area Prior to the Boat Salt Unloading at UTL

Exposure Periods: (1986)	Moss Sites (see attached figure)												
	To West of UTL Salt Storage Pad							To East of UTL					
	Site	3	4	5	7	8	12	2	9	10	11	13	14
Sept. 16-23	Cl	200	400	200	200	300	-	200	200	300	200	300	200
	Na	220	230	240	300	190	-	250	190	220	180	230	230
Sept. 23-Oct. 1	Cl	100	200	200	200	100	-	200	200	200	200	200	200
	Na	100	88	79	84	73	-	70	82	61	88	91	68
Oct. 1-7	Cl	200	200	200	200	200	200	200	200	300	200	200	200
	Na	150	150	160	180	180	140	160	160	160	160	160	150
Oct. 7-14	Cl	300	300	300	400	200	300	200	400	300	400	I.S.	300
	Na	260	310	390	320	230	350	200	360	310	380	270	400
Oct. 14-22	Cl	300	I.S.	300	I.S.	300	300	I.S.	200	300	300	I.S.	200
	Na	170	180	180	190	170	200	190	150	150	170	230	170
Oct. 22-28	Cl	I.S.	200	I.S.	M	I.S.	I.S.	I.S.	300	I.S.	300	300	300
	Na	210	210	190	M	200	260	210	200	190	220	230	220
Oct. 28-Nov. 5	Cl	200	200	200	300	200	200	200	200	200	200	200	300
	Na	110	90	110	130	93	130	100	120	100	130	100	130

I.S. - insufficient sample

M. - moss bag missing

Table 2
Moss Bag Concentrations (ppm, dry wt.) of Chloride and Sodium Detected in the UTL
Survey Area During and Following the Boat Salt Unloading Period

Exposure Periods: (1986-87)	Moss Sites (see attached figure)												
	To West of UTL Salt Storage Pad							To East of UTL					
	Site	3	4	5	7	8	12	2	9	10	11	13	14
Nov. 5-18	Exposure Period Salt Shipment Unloaded at UTL												
	Cl	I.S.	500	I.S.	500	I.S.	I.S.	I.S.	1,500	1,300	800	700	I.S.
	Na	210	340	1,400	250	230	670	290	950	850	460	330	450
Nov. 18-24	Exposures Following Salt Unloading at UTL												
	Cl	I.S.	I.S.	I.S.	I.S.	I.S.	300	300	I.S.	I.S.	I.S.	I.S.	300
	Na	320	490	510	210	200	230	360	180	200	230	200	400
Nov. 24-Dec. 9	Cl	300	500	700	300	300	400	I.S.	400	200	400	500	400
	Na	360	530	780	360	340	470	360	330	340	320	390	390
Dec. 9-17	Cl	I.S.	I.S.	I.S.	400	900	I.S.	600	400	I.S.	900	I.S.	I.S.
	Na	310	260	510	280	450	220	310	230	280	510	720	390
Dec. 17-Jan. 16/87	Cl	600	800	1,600	1,000	1,200	600	1,100	600	800	1,100	1,300	1,100
	Na	480	650	1,100	640	820	490	720	360	430	890	1,200	680
Jan. 16-Feb. 16	Cl	900	900	2,100	1,800	I.S.	I.S.	1,600	I.S.	700	2,200	1,800	I.S.
	Na	590	620	1,500	1,200	1,700	400	1,100	560	440	1,400	1,200	1,100
Feb. 16-Mar. 18	Cl	600	700	1,100	1,000	1,400	I.S.	1,700	600	600	1,300	2,000	1,100
	Na	400	460	740	690	910	440	1,100	440	620	780	1,500	830
Mar. 18-Apr. 21	Cl	500	500	500	500	400	400	1,000	300	400	500	900	600
	Na	330	390	360	360	240	280	730	220	280	390	530	460

I.S. - insufficient sample

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